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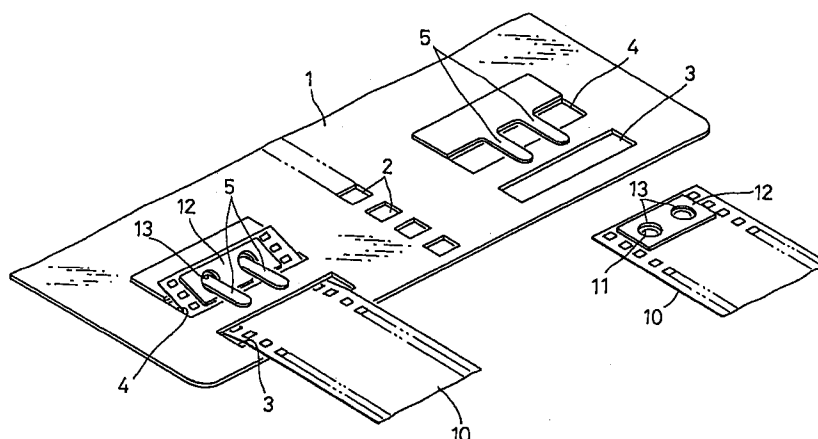
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(54) **Photographic film**

(57) In order to improve the connecting strength of a photographic film with a leader, the photographic film being connected with the leader by the engagement with an engaging piece provided on the leader and conveyed by being pulled by the leader, engaging holes 11 engageable with engaging pieces 5 provided on a leader 1 are formed at a leading end portion of a photo-

graphic film 10. Portions of the photographic film 10 around the engaging holes 11 are reinforced by adhering a reinforcement piece 12 to the leading end portion of the photographic film 10, thereby preventing the photographic film 11 from being torn at the engaging holes 11.

FIG. 1



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Description

The present invention relates to an undeveloped photographic film which is to be developed by a film developing apparatus of leader-convey type.

Generally, when a photographic film is developed by an automatic film developing apparatus of leader-convey type, an undeveloped photographic film is connected with a flexible leader and is conveyed after the leader along a film conveyance path of a developing device.

The leader and the photographic film are generally connected by adhering a splice tape thereto. However, this requires a splice gauge in order to connect the photographic film in a specified position of the leader. Further, when the photographic film is separated by cutting after the development, the splice tape remains on the leader, making it necessary to peel the splice tape from the leader to be reused. Thus, this connection is very cumbersome.

Further, this connection is uneconomical because the splice tape cannot be reused.

In order to solve such a problem, the applicant of the present application proposed a film connecting construction of film-hook type in which an engaging piece is provided on a leader and an engaging hole is formed at the leading end of a photographic film and the engaging piece is engaged with the engaging hole in Japanese Unexamined Patent Publication No. 9-73161.

In the automatic film developing apparatus of leader-convey type, the film is pulled by the leader being conveyed before it. Accordingly, a resistance produced during the movement of the film acts on the connecting portion with the leader. In the film connecting construction of film-hook type, a pulling force acts on the engaging hole formed at the leading end of the film. Accordingly, if the film is caught during the conveyance, it may be torn at the engaging hole. Particularly, since a 135 film taken up into a cartridge is thinner than an APS film, it is likely to be torn.

An object of the present invention is to enhance the connection strength of a film with a leader in the development of the film using a leader of film-hook type.

In order to solve the above problem, the invention is directed to a photographic film formed at a leading end portion thereof with at least one engaging hole which is engageable with a corresponding engaging piece provided on a leader for pulling the photographic film, wherein the leading end portion of the film is reinforced by adhering a reinforcement piece thereto, and the reinforcement piece is formed with a corresponding cut hole in a position facing the engaging hole.

Hereafter, one embodiment of the invention is described with reference to the accompanying drawings which show in:

FIG. 1:
an exploded perspective view of a leader and a photo-

graphic film according to the invention;

FIGS. 2(I) and 2(II):

an exploded perspective view of the photographic film and a reinforcement piece and a section of the photographic film adhered with the reinforcement piece, respectively;

FIGS. 3(I), 3(II) FIG. 3(III):

front and plan views of a reinforcement piece adhering apparatus, and a front view showing the operation of the adhering apparatus, respectively;

FIG. 4:

a perspective view of another example of the photographic film; and

FIG. 5:

a section showing a connected state of the leader and the photographic film.

FIG. 1 shows a film pulling leader 1 and an undeveloped photographic film to be pulled by the leader 1.

The leader 1 is flexible because being made of a synthetic resin sheet, and feed perforations 2 are formed at regular intervals in the middle of the leader 1 along the widthwise direction thereof. First and second insertion holes 3, 4 are so formed as to be spaced apart along the forward and backward directions of the leader 1 at left and right sides of the rear end of the leader 1. Above each second insertion hole 4 are provided a pair of engaging pieces 5 crossing the second insertion hole 4 along the forward and backward directions. The respective engaging pieces 5 are elastic and the front ends thereof are integrally adhered to the leader 1.

The photographic film 10 is formed at its leading end with engaging holes 11 engageable with the engaging pieces 5. The leading end of the photographic film 10 is reinforced by adhering a reinforcement piece 12, which is formed with cut holes 13 in positions in conformity with the engaging holes 11.

The cut holes 13 may be formed in advance before the reinforcement piece 12 is adhered or may be formed simultaneously with the engaging holes 11 after the reinforcement piece 12 is adhered.

In the case that the cut holes 13 are formed in advance, the inner diameter of the cut holes 13 is set larger than that of the engaging holes 11 as shown in FIGS. 2(I) and 2(II) in order to facilitate the positioning of the cut holes 13 with respect to the engaging holes 11 and in order to prevent an adhesive used to adhere the reinforcement piece 12 from coming out to the engaging holes 11.

FIG. 3 shows a reinforcement piece adhering apparatus 20 for automatically adhering the reinforcement piece 12 to the photographic film 10.

As shown in FIG. 3, the adhering apparatus 20 is comprised of a reinforcement piece feeding unit 21 and a reinforcement piece pressing device 22 for adhering the reinforcement piece 12 fed from the feeding unit 21 to the upper surface of the photographic film 10. The feeding unit 21 operates as follows. A separator 24

pulled from a rotatably supported reinforcement piece roll 23 to a table 31 is guided by a first guide 25 in the form of a roller, thereby reversing a direction of conveyance. The separator 24 is further guided by a second guide 26 and inserted between a pair of feed rollers 27, and is moved by the rotation of the feed rollers in arrow directions. In this way, the reinforcement piece 12 adhered to the separator 24 is peeled from the separator 24 in the position of the first guide 25.

When one reinforcement piece 12 is peeled from the separator 24, the pair of feed rollers 27 move the separator 23 until the leading end of a next reinforcement piece 12 is peeled to a specified degree and cause this reinforcement piece to wait in an adhering position.

The pressing device 22 includes a pressing roller 28 and a solenoid for moving the pressing roller 28 with respect to the upper surface of the table 31.

The solenoid 29 of the pressing device 22 lowers the pressing roller 28 after the photographic film 10 is pulled from a cartridge placed on a cartridge holder 33 on a support table 32 in such a manner that a spool C projects through a notch 35 formed in one side surface 34. By the downward movement of the pressing roller 28, the leading end of the reinforcement piece 12 is adhered to the upper surface of the photographic film 10.

The pressing device 22 and the feeding unit 21 are moved respectively to positions shown in phantom in FIG. 3(III) when the pressing roller 22 presses the reinforcement piece 12. By this movement, the reinforcement piece 12 is peeled from the separator 24 and is adhered to the leading end of the photographic film 10 by the pressing roller 28.

Here, the pair of cut holes 13 are formed in the reinforcement piece 12 and they are larger than the engaging holes 11 formed in the photographic film 10 as shown in FIG. 2. This reinforcement piece 12 is adhered to the upper surface of the photographic film 10 such that the cut holes 13 face the engaging holes 11.

The reinforcement piece 12 may be made of any desired material. If a heat tape which can be adhered by application of heat is used, a data necessary for the development can be printed on the reinforcement piece since the base material of the heat tape is made of paper. As shown in FIG. 4, a large amount of data can be written by forming a data writing portion 14 continuous with the reinforcement piece 12.

During the development of the photographic film 10 having the above construction, as shown in FIG. 5, the leading end of the photographic film 10 is inserted into the first insertion hole 3 from the front side of the leader 1; the leading end thereof projecting to the rear side of the leader 1 is inserted into the second insertion hole 4; and then the engaging holes 11 are engaged with the engaging pieces 5. Thereafter, the photographic film 10 is conveyed after the leader 1 along the developing device of the automatic film developing apparatus.

Since the photographic film 10 is pulled by the leader 1, loads act on the engaging portions of the engaging holes 11 with the engaging pieces 5 if the photographic film 10 is caught in the conveyance path.

At this time, since the portion of the photographic film 10 around the engaging holes 11 is reinforced by adhering the reinforcement piece 12, there is no likelihood that the photographic film 10 is torn at the engaging holes 11 even if the photographic film 10 is such a thin and sort film as a 135 film. Therefore, the photographic film 10 can be securely conveyed together with the leader 1 along the developing device.

As described above, according to the invention, the leading end of the photographic film formed with the engaging holes is reinforced by adhering the reinforcement piece. Accordingly, the connecting strength of the photographic film with the leader can be enhanced, making it possible to prevent the photographic film from being torn at the engaging holes while the photographic film is conveyed by being pulled by the leader.

LIST OF REFERENCE NUMERALS

1	Leader
5	Engaging Piece
10	Photographic Film
11	Engaging Hole
12	Reinforcement Piece
13	Cut Hole
20	Reinforcement Piece Adhering Apparatus
21	Reinforcement Piece Feeding Unit
22	Pressing Device

Claims

1. A photographic film (10) formed at a leading end portion thereof with at least one engaging hole (11) which is engageable with a corresponding engaging piece (5) provided on a leader (1) for pulling the photographic film (10), wherein the leading end portion of the film (10) is reinforced by adhering a reinforcement piece (12) thereto, and the reinforcement piece (12) is formed with a corresponding cut hole (13) in a position facing the engaging hole (11).
2. A photographic film (10) according to claim 1, wherein the inner diameter of the cut hole (13) is larger than that of the engaging hole (11).

FIG. 1

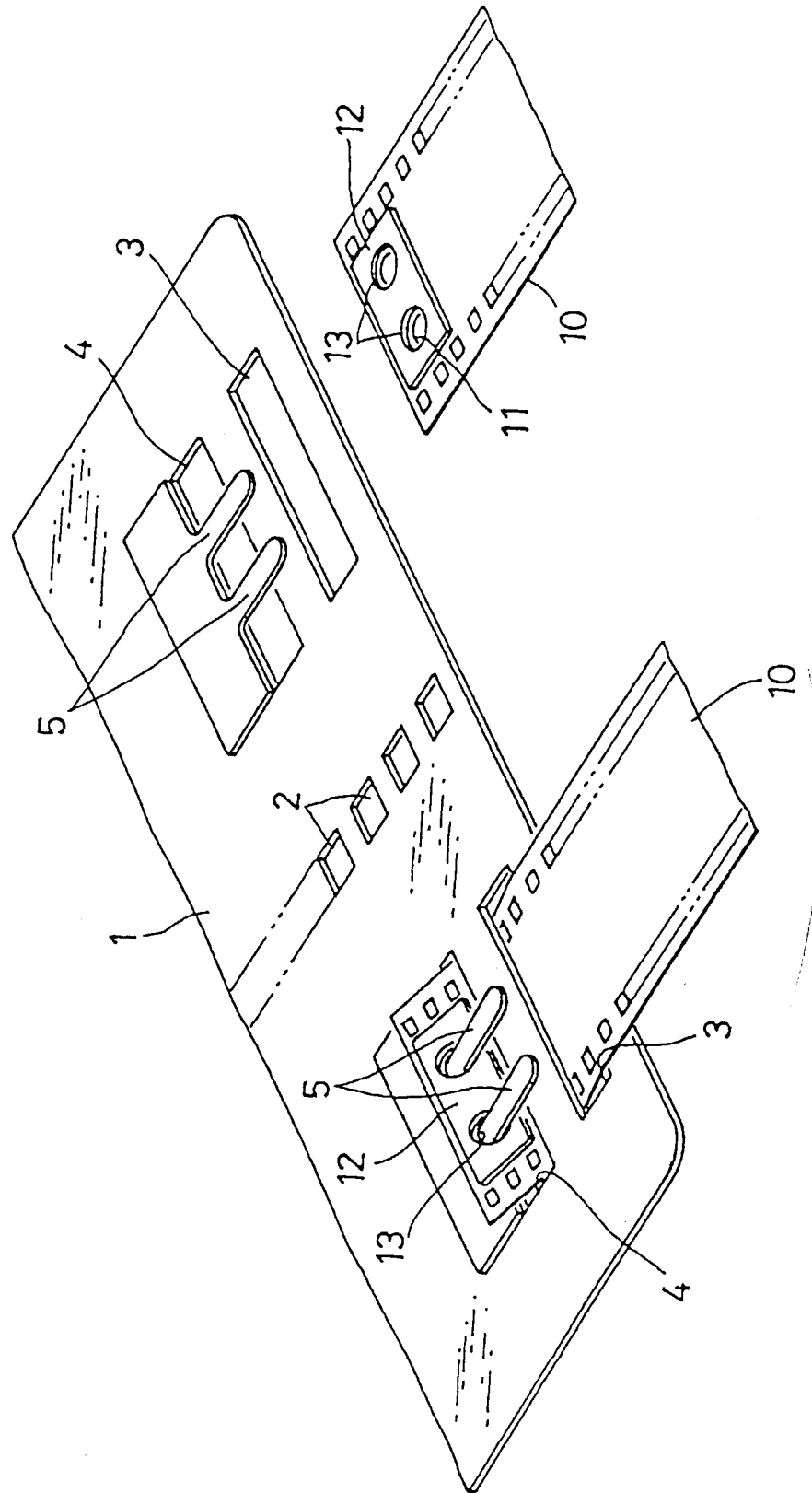


FIG. 2

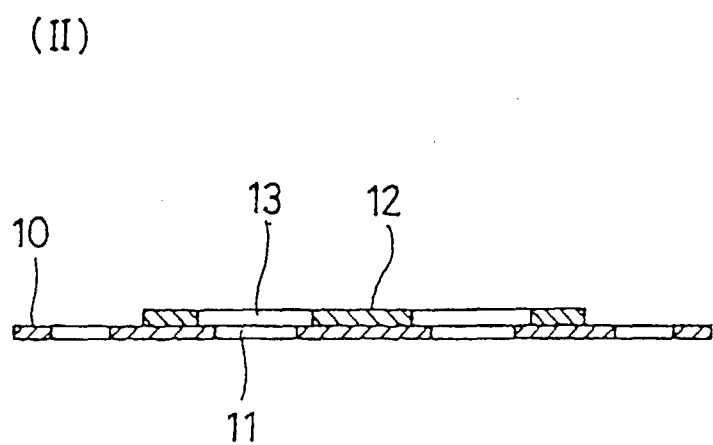
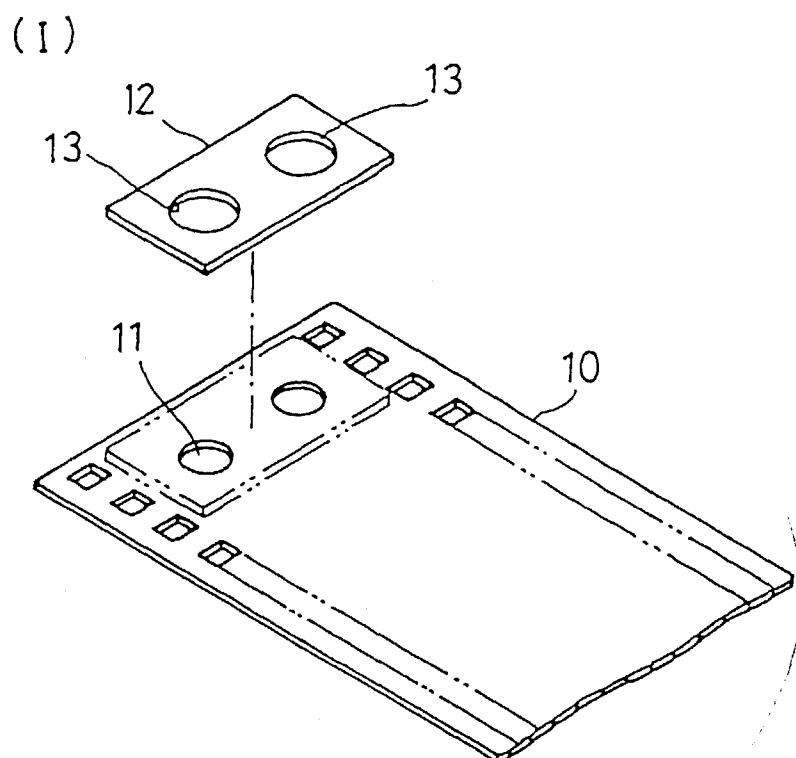


FIG. 3

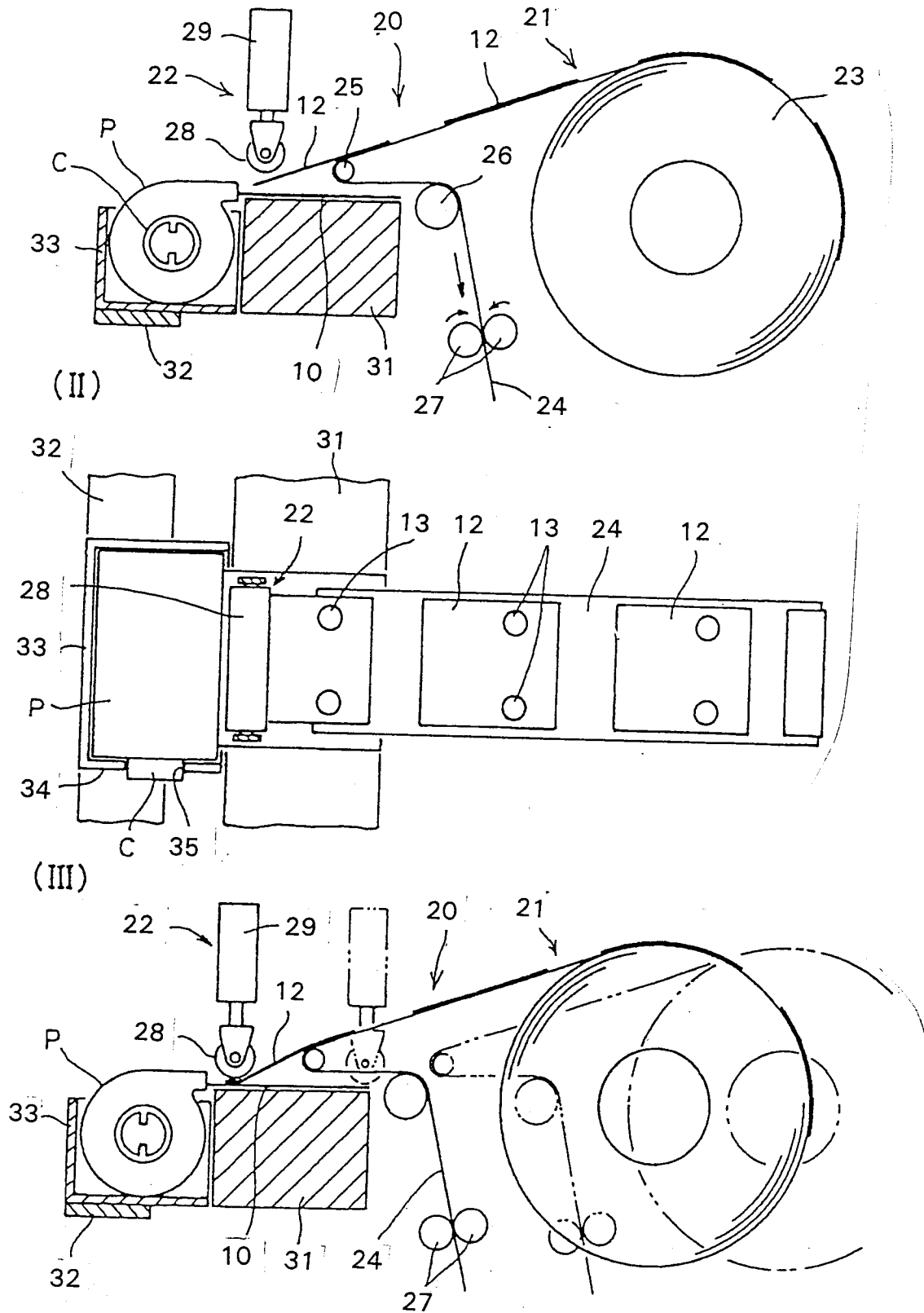


FIG. 4

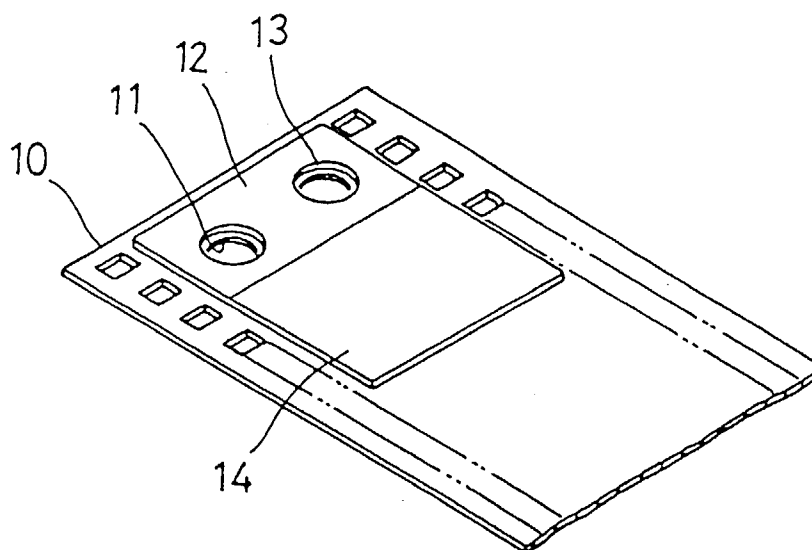


FIG. 5

